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09/504,022	02/18/2000	Richard S. Szeliski	MCS-093-99	9342

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EXAMINER

MILLER, RYAN J

ART UNIT

PAPER NUMBER

2621

DATE MAILED: 11/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/504,022

Applicant(s)

SZELISKI ET AL.

Examiner

Ryan J. Miller

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 February 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because a) reference characters "118" and "128" have both been used to designate the magnetic disk drive on page 6 of the specification, b) reference characters "410" in the specification and "412" in Fig. 4 have both been used to designate the first memory device, c) reference characters "412" in the specification and "410" in Fig. 4 have both been used to designate the second memory device, and d) reference characters "410" on page 10 of the specification and "408" in Fig. 4 and on page 9 of the specification have both been used to designate the host processor. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

The following quotations of 37 CFR § 1.75(a) and (d)(1) are the basis of objection:

(a) The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

(d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description. (See § 1.58(a)).

1. Claims 6, 11, and 12 are objected to under 37 CFR § 1.75 as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention or discovery. Regarding claim 6, the claim language "models" at line 7 has no antecedent basis. The following language (or equivalent) is suggested for line 5 of the claim: use the same language as in Fig. 3, block 312, such as "rendering models and accumulating statistics of the

Art Unit: 2621

loaded digital data.” regarding claims 11 and 12, the claim language “addresses “ at line 2 and line 2, respectively, lacks antecedent basis. If these claims were dependent upon claim 10 instead of claim 9, this would not be a problem. The above suggestions will be assumed for examination purposes.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 6-8 and 11-20 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

In order to clarify the basis of this rejection, the examiner will begin with a brief summary of the specification. The specification seems to be drawn (in part) to a system for comparing an image and a template to determine “a match or non-match between the template and the image” (specification page 8, line 19). During the comparison, the template and image may be geometrically transformed (i.e., claimed as “raster transformed”) such as “incrementally rotated or skewed” (specification page 8, line 10). This aspect of the disclosed invention is described generally at section II, General Overview, and is depicted in Fig. 2.

However, the specification describes certain (presumed) implementations of this comparison process that is not well understood as disclosed. For example, Section III, Details of Components and Operation, presumably describes an implementation of the image comparison

Art Unit: 2621

in a "rendering" embodiment. For example, this is described at specification page 10, lines 5-19 and as depicted in Fig. 3. While this implementation seems to discuss the model generation, the interpolation of texture, and the computing of statistics between color values, there is no discussion of image comparison, and no apparent link to the image comparison disclosure of section II, General Overview. In fact, it is not clear from the specification what section III is disclosing at all. What process is being performed by section III? There is a fundamental disconnect between sections II and III in that it is not described how the image comparison of section II, and as depicted in Fig. 2, is utilized in the model generation, texture interpolation and statistics computation of section III.

Specification page 11, beginning at line 12, seems to return to the image comparison embodiment where at page 12, a metric of comparison is disclosed. Pages 13 and 14 then seem to discuss alternate methods of comparing two images.

Section V, Working Example, then seems to return to the model generation discussed at section III. Again, it is not clear from the description of the working example how, if at all, two images are being compared commensurate with the general overview of section II.

In summary, there seem to be two distinct disclosures in the specification that are not related, or reliant upon one another. While the examiner understands those portions of the specification relating to the comparison of two images (e.g., Fig. 2), the examiner does not understand how the image comparison is related to the model generation as depicted in Figs. 3-5.

The claims directed to these portions of the specification appear to be claims 6-8 and 11-20. Claim 18 will be used to exemplify the 112 first paragraph rejection: but all of the above mentioned claims are rejected on the same grounds, for the same reasons. Claim 9, from which

Art Unit: 2621

claim 18 depends, requires a processor that transforms templates and a processor that compares image associated with the templates. This seems to be supported by the specification in relation to figure 2, and section II. However, claim 18 further requires the comparing process to alpha blend color components for blending source and destination surfaces. There is no description of this in the disclosure, and thus the elements of this claim are not enabled. The alpha blending per se, seems to be supported at specification page 15, at lines 21-28. However, where is a comparison processor (that compares two images or templates) performing alpha blending? It is unclear from the specification where the elements of claim 18 are disclosed, if at all. Therefore, the claim lack a descriptive support in the specification that would not enable one of ordinary skill in the art to make and use the claimed invention without undue experimentation. The remaining aforementioned claims are rejected on the same grounds. Clarification is required.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 6-8 and 11-20 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 6-8 and 11-20 are drawn to an invention that lacks enablement, and lacks clear and understandable support in the specification as described above. In summary, the examiner is uncertain how the disclosed image comparison is related to the disclosed model generation/texture interpolation embodiments as described above. Therefore, the metes and bounds of the claims that are apparently drawn to the model building embodiment and that include image comparison are completely unclear. That is, the claims cannot be understood in light of the disclosure. In addition, as it appears the claims define an invention that lacks support

Art Unit: 2621

in the disclosure, the claim appear to be inconsistent with the specification and are rejected under 112 second paragraph on this basis. That is, if the claimed invention is inconsistent with the disclosed invention, the metes and bounds of the claim are unclear for that reason alone (see MPEP 2173.03).

Claim 18 recites the limitations "an additional" in line 3, "the source surface" in line 4, and "the destination surface" in line 5. There is insufficient antecedent basis for this limitation in the claim. The claim is not understood by the examiner due to this lack of antecedent basis. Therefore, the examiner interprets the claim as "The system for tracking digital templates of claim 9, wherein the compare processor comprises an alpha blending device that blends two pixels of different color" for examining purposes.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 9-17, 19, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Neff et al. (U.S. Patent No. 5,809,171 A). As applied to claim 1, Neff et al. discloses a method for comparing and matching a first set of digital data (see Fig. 11: The template image is the first set of digital data) to at least a second set of digital data (see Fig. 11: The test image is the second set of digital data), comprising: raster transforming (NOTE: The examiner interprets a raster transformation as a geometric transformation, such as, but not limited to, a rotation or skew as described on page 8 of the specification) at least one of the first set of digital data and the second

Art Unit: 2621

set of digital data (see Fig. 11: Block 102 describes a geometric warping of the template image); and statistically comparing an matching the raster transformed sets of digital data to appropriately corresponding portions of each other (see Fig. 11: Block 112 describes comparing and correlating the template and the test image).

As applied to claim 2, Neff et al. discloses analyzing the statistical comparisons and generating new transformations for matching the sets of data (see column 19, lines 42-48). The reference describes that the greatest correlation of each individual piece can be summed to determine an overall correlation (i.e. analyzing the statistical comparisons). Then the comparison process can be repeated for different scales and rotational offsets (i.e. generating new transformations for matching the sets of data).

As applied to claim 3, Neff et al. discloses statistically comparing the raster transformed sets of digital data until a match or non-match between the first and second sets of data is achieved (see column 19, lines 10-20). The reference describes that the overall correlation of the image can be determined at each relative rotational offset and each relative scaling by summing the greatest correlation of each piece of the template (i.e. statistically comparing the raster transformed sets of digital data). If the greatest overall correlation between the test image and the template is greater than a predetermined minimum correlation, then they are considered matched (i.e. until a match or non-match between the first and second sets of data is achieved).

As applied to claim 9, Neff et al. discloses a system for tracking digital templates of a digital scene defined by plural images (see Fig. 11: Block 114 describes frame-to-frame tracking), comprising: a raster processor that transforms at least one of the templates (i.e. see Fig. 1: Blocks 42 and 44 describe a rotation means and a scaling means, respectively). The purpose of these

elements is to rotate the template and scale the template (i.e. transforms at least one of the templates.); and a compare processor that simultaneously and statistically compares and matches images associated with the templates for tracking the templates (see Fig. 1: Block 34 represents the correlation means and block 28 represents the comparison means. These devices are used to determine the correlation between the template and test image. The comparison means 28 also includes means for separately comparing each of the temporally distinct test images to the template (i.e. tracking).).

As applied to claim 10, Neff et al. discloses that the compare processor comprises an address generator that generates addresses for the template and the image that are to be compared (see column 15, lines 31-35). The reference describes an address generator that supplies pixel addresses to define the relative positions of the template pixels and test image pixels (i.e. generates addresses for the template and the image that are to be compared).

As applied to claim 11, Neff et al. discloses that the addresses reflect transformations, including combinations of rotations, scales and perspective transforms of the template or image (see column 15, lines 34-35). The reference describes that the pixel addresses generated by the address generator are used to define the relative positions of the template pixels to the test image pixels and, consequently, determine the relative rotation or scaling.

As applied to claim 12, Neff et al. discloses that the addresses serve as input to filtering functions that read from the images to be compared and generate color values (see Figs. 10 and 11, and column 17, lines 1-10). The reference describes an address generator that provides an address for each pixel in the template image. The processing units 92 use these addresses (i.e. the addresses serve as input). One of the functions of the image processor is to remove some of the

Art Unit: 2621

background shading (step 106) by determining the average gray level of the pixels in a predetermined region about each individual pixel. This average gray level value is then subtracted from the gray level of the individual pixel (i.e. filtering functions that read from the images to be compared). Once this process has been repeated for each pixel, a predetermined value from 0-255 is added to the gray level of each pixel (i.e. generate a color value).

As applied to claim 13, Neff et al. discloses that the template comprises a group of pixels of the image and wherein the compare processor comprises an acceptance tester preprogrammed to decide whether to allow a pixel of the template to contribute to the statistics (see column 10, lines 45-56). The reference describes a template processing means that determines the number of pixels that form the template (i.e. the template comprises a group of pixels of the image). This template processing means also includes means for determining which pixels in the template correspond to a given label and, ultimately, contribute to the correlation calculation (i.e. the compare processor comprises an acceptance tester preprogrammed to decide whether to allow a pixel of the template to contribute to the statistics).

As applied to claim 14, Neff et al. discloses that the color values are sent to a statistics/comparison device for statistical analyses and comparison processing (see column 11, lines 34-51). The color values are the gray level values of each of the labels (i.e. regions) of the template. These values are used by the correlation means and comparison means to determine the correlation.

As applied to claim 15, Neff et al. discloses that the statistics/comparison device contains variables that are updated for each pixel based on the input color values (see column 11, lines 23-33). The reference describes the use of N values that are used by the correlation and comparison

means to determine the correlation (i.e. the statistics/comparison device contains variables that are updated for each pixel). These values are based on the gray level of a particular area (i.e. based on the input color values).

As applied to claim 16, Neff et al. discloses that the statistical analyses compares and matches the template to the image by initially defining a function that estimates the similarity between the template and the image (see column 11, lines 34-51). The reference describes equation (1) that is used to determine the correlation X (i.e. defining a function that estimates the similarity between the template and the image).

As applied to claim 17, Neff et al. discloses that the template is located in the image by computing the function at various locations in the image and determining where the function is maximized (see column 19, lines 10-20). The reference describes a system processor that determines the relative offset between the template image and the test image (i.e. the template is located in the image by computing the function at various locations in the image) that provides the greatest correlation between the two images (i.e. determining where the function is maximized).

As applied to claim 19, Neff et al. discloses raster processor renders the template at a plurality of offsets for allowing the raster processor to at least one of determining a desired position for the template and accumulate information to analytically compute a desired update (see Fig. 1, column 12, lines 66-67, and column 13, lines 1-3). The reference describes an offset means 36 for creating offsets between the template and test image (i.e. renders the template at a plurality of offsets) such that the template is compared to any number of different regions of the test image (i.e. allowing the raster processor to determine a desired position for the template).

As applied to claim 20, Neff et al. discloses the offsets are fractional perturbations to vertices of the templates (see column 18, lines 20-39). The reference describes an offset means that allows pieces of the template to be compared to several different portions of the test image. Therefore, the offsets are fractional perturbations, since only a portion of the template moves across the image, of the vertices of the templates, since the edges of the template define the offsets.

5. Claims 1, and 4-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Schott (U.S. Patent No. 5,850,466 A). As applied to claim 1, Schott discloses a method for comparing and matching a first set of digital data (see Fig. 4: The first set of digital data is the sample image) to at least a second set of digital data (see Fig 4: The second set of digital data is the golden template image), comprising: raster transforming at least one of the first set of digital data and the second set of digital data (see Fig. 4: Block 68 describes determining a scale, rotation, and sub-pixel translation of the test image); and statistically comparing an matching the raster transformed sets of digital data to appropriately corresponding portions of each other (see Fig. 4: Block 76 describes comparing test image to the golden template image).

As applied to claim 4, Schott discloses that the raster transforming comprises raster transforming at least one of the first or the second set of digital data and computing statistics on the transformation (see column 8, lines 6-12). The reference describes determining and quantizing the scale and rotation of an image (i.e. raster transforming at least one of the first or the second set of digital data) and accumulating the sum and sum-of-squares of each image (i.e. computing statistics on the transformation).

As applied to claim 5, Schott discloses statistically comparing and matching comprises analyzing the computed statistics of the transformation and calculating new and different transformations on the digital data (see Fig. 3A). From Fig. 3A it can be seen that after the computed statistics are analyzed (i.e. block 56-accumulate sum and sum-of-squares of image in indexed bin), the process loops back to the beginning and new transformations are computed (i.e. block 50-determine rotation, scale, and sub-pixel translation).

As applied to claim 6, Schott discloses a method for comparing and matching a first set of digital data (see column 8, line 50: The first set of digital data is the test image) to at least a second set of digital data (see column 9, line 5: The second set of digital data is the golden template image), comprising: loading at least one of the first and second sets of digital data into a first memory device (see column 8, line 49-54: The reference describes acquiring the test image. Since all of the processing in this reference is performed on computers, it is necessary to store the acquired image in memory. The reference does not specifically mention the use of memory, however, the use of memory is inherent to the teachings of Schott for the preceding reasons.); rendering model transformations and accumulating statistics of the loaded digital data (see Fig. 3A: Block 50 determines rotation and scale and Block 56 accumulates the sum and sum-of-squares of the image.); adjusting the models based on the accumulated statistics (see Fig. 3A: As can be seen by the loop this process is performed n times, thereby adjusting the model based on the results of the accumulate sum and sum-of-squares for the image block.); and statistically comparing and matching the model transformations of the loaded set of digital data to appropriately corresponding portions of the other set of digital data (see Fig. 4: Block 76

Art Unit: 2621

describes comparing the test image and the golden template image using the golden variation image.).

As applied to claim 7, Schott discloses statistically comparing the sets of digital data until a match or non-match between the first and second sets of data is achieved (see column 3, lines 24-39). The reference describes comparing the test image to a threshold image that is computed using a standard deviation image (i.e. statistically comparing the sets of digital data). Then significant differences between the two images are detected. If significant differences are detected, then it is a non-match, if not, then it is a match.

As applied to claim 8, Schott discloses that adjusting the models comprises analyzing the statistical comparisons and generating new transformations for matching the sets of data (see Fig. 3A: The figure shows that the procedure has a loop that is performed n times and, therefore, n new transformations are performed).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J. Miller whose telephone number is (703) 306-4142. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Boudreau can be reached on (703) 305-4706. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.

Application/Control Number: 09/504,022
Art Unit: 2621

Page 14



Ryan J. Miller
November 15, 2002

Ryan J. Miller
Examiner
Art Unit 2621



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